PAUL FLOYD FRANK

1950-1967

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SCIENTIFIC CONTRIBUTIONS AND PICTORIAL REVIEW OF:

PAUL FLOYD FRANK

CHIEF, DIVISION OF BACTERIOLOGY
NAVAL MEDICAL RESEARCH UNIT NO. 4
GREAT LAKES, ILLINOIS

1950 - 1967

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PREFACE

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PREFACE

This book was prompted by the untimely demise of Mr. Paul F. Frank, Chief of the Bacteriology Division, Naval Medical Research Unit No. 4., Great Lakes, Illinois.

Mr. Frank had been employed by this research activity for over 17 years, and in his capacity as bacteriologist, has contributed greatly to the control of streptococcal infections and rheumatic fever disease in naval recruits. For these contributions, he has been posthumously awarded the Navy's second highest civilian citation, "The Superior Civilian Service Award".

The contents of this book contain summaries of Mr. Frank's important contributions to the understanding and prevention of these diseases and reflect the high professional caliber of his work.

Included with the literature summation are some of his awards, many letters of commendation and condolence from outstanding members of the scientific community, both civilian and military.

Also shown is a pictorial review of some of the highlights of his professional activities, formal events of note, as well as some of the more lighthearted moments during his career.

This book is dedicated to the perpetuation of his memory by the scientific accomplishments which he leaves to posterity for the benefit of mankind.

TITLES

Chief, Division of Bacteriology, Naval Medical Research Unit No. 4, Great Lakes, Illinois

Member, Committee on Prophylaxis of Streptococcal Infections (Armed Forces Epidemiological Board, Commission on Streptococcal and Staphylococcal Diseases)

Consulting Bacteriologist, Committee on Meningococcal Infections (Armed Forces Epidemiological Board, Commission on Acute Respiratory Diseases)

Member, Technical Committee, American Public Health Association, Chapter 5, "Streptococcal Infection" in Diagnostic Procedures and Reagents, 1960

Member, Science Seminar Faculty, North Chicago Community High School, North Chicago, Illinois

PAUL FLOYD FRANK
1918 - 1967

SECTION I

AWARDS

AND

COMMENDATIONS

HONORS

Listed in American Men of Science

Recipient of the Navy Superior Civilian Service Award

One of Chicago's Outstanding Federal Professional Employees, Chicago Metropolitan area, 1961

Letter of Appreciation from Commanding Officer, U.S. Naval Hospital, Great Lakes, Illinois, for his part in effective rheumatic fever prophylaxis program

Letter of Appreciation from Officer in Charge, U.S. Navy Preventive Medicine Unit No. 5, San Diego, California for superb professional services assisting with meningococcal problems in San Diego, 28 May 1963

Letter of Appreciation from Superintendent of Schools, North Chicago, Illinois for participation in Science Seminar Programs, 27 July 1962, 26 June 1963 and 13 October 1964

CITATION

PAUL FLOYD FRANK

During seventeen years of outstanding service at the Naval Medical Research Unit Number Four, Great Lakes, Illinois, Paul Floyd Frank distinguished himself by exceptional and exemplary contributions in the fields of streptococcal and meningococcal prophylaxis, the prevention of rheumatic fever, and the prevention of chronic rheumatic heart disease with benefits of great value to the Naval Training Center, Great Lakes, Illinois, to the Navy as a whole and with wide application to military medicine and to the civilian populace. For exemplary research achievements and scientific publications which have added significantly to the prestige of Navy Medical Research, Paul Floyd Frank is richly deserving of the Superior Civilian Service Award.

Department of the Navy

SUPERIOR CIVILIAN SERVICE

This certificate of award is

presented to

Paul Floyd Frank

In recognition and appreciation of

Superior Service which has been of

exceptional value and great benefit

to the Navy

31 July 1967
Date

R.B. BROWN
Vice Admiral, MC, USN
Surgeon General of the Navy

THE REGIONAL COUNCIL OF FEDERAL AGENCIES
AND
THE FEDERAL PERSONNEL COUNCIL OF CHICAGO
PRESENTS TO

PAUL FLOYD FRANK

THIS

CITATION

IN RECOGNITION OF HIS SELECTION
AS ONE OF
CHICAGO'S OUTSTANDING

PROFESSIONAL EMPLOYEES OF THE YEAR – 1961

Elmore L. Harmon
CHAIRMAN,
FEDERAL PERSONNEL COUNCIL

CHAIRMAN,
REGIONAL COUNCIL OF FEDERAL AGENCIES

MAY 24, 1961

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NH13-1-mk
29 March 1961

Captain Lloyd F. Miller, MC, USN
Officer in Charge
Naval Medical Research Unit No. 4
U.S. Naval Training Center
Great Lakes, Illinois

Dear Captain Miller:

It is with pleasure that I acknowledge the importance of the research on prophylaxis of rheumatic fever performed by Mr. Paul F. Frank of your staff.

The development of the prophylactic program over the past eight years has resulted in a marked reduction in rheumatic fever cases admitted to this hospital. This has prevented much needless illness and suffering and has also saved many thousands of dollars.

Mr. Frank's continued willingness to provide bacteriological services beyond the capabilities of a hospital laboratory is also acknowledged and reflects very favorably on the quality of our Civil Service personnel in the Navy.

Sincerely yours,

J. B. BUTLER
CAPTAIN MC USN
COMMANDING OFFICER

Copy to:
ComNine
DMO, 9ND
BuMed
CIRD

COPY

U.S. NAVY PREVENTIVE MEDICINE UNIT NO. 5
U. S. Naval Hospital
San Diego 34, California

PMU5/EES:tld
6200
28 May 1963

From: Officer in Charge, U.S. Navy Preventive Medicine Unit No. 5
U.S. Naval Hospital, San Diego 34, California
To: Officer in Charge, U.S. Naval Medical Research Unit No. 4
U.S. Naval Hospital, Great Lakes, Illinois

Subj: Services of Mr. Paul Frank; appreciation for

1. The Unit wishes to commend Mr. Paul Frank for his superb professional services in proving in vitro sulfadiazine resistance of Group B meningococcus isolated from recruits at the U.S. Naval Training Center, San Diego. Mr. Frank's laboratory findings confirmed the Unit's conclusions relevant to in vivo carrier resistance to sulfadiazine prophylaxis.

2. Mr. Frank is authorized and encouraged to present all information relating to the U.S. Naval Training Center, San Diego meningococcus sulfadiazine resistance at the American Medical Association Annual Meeting at Atlantic City. It is important that all data related to the present outbreak be made a matter of record for purposes of subsequent publication under official Navy auspices.

E. E. SIESS

COPY

NORTH CHICAGO COMMUNITY HIGH SCHOOL
1717 Seventeenth Street
North Chicago, Illinois

July 27, 1962

Admiral F. P. Kruez
United States Naval Hospital
Great Lakes, Illinois

My dear Admiral Kruez:

In reviewing the accomplishments of the past school year, we consider the Science Seminar which is conducted by scientists from industry and professional institutions as contributing an outstanding service to our school and community. We think that the people who give this invaluable service deserve recognition and we would appreciate your encouraging them in their civic endeavor.

People from your organization who participated in the Science Seminar Program are as follows:

Mr. Paul Frank	Science Seminar Faculty
Lt. John C. Maisel	Science Seminar Faculty
Lt. Michael W. Rytel	Science Seminar Faculty Sponsored Student Project

Sincerely,

LESTER J. HARMAN
Superintendent

LJH:lw

COPY

NORTH CHICAGO COMMUNITY HIGH SCHOOL
1717 Seventeenth Street
North Chicago, Illinois

June 26, 1963

Admiral F. P. Kruez
United States Naval Hospital
Great Lakes, Illinois

Dear Admiral Kruez:

We are particularly proud of our Science Seminar which is offered on an honors basis to those gifted students who are interested in science. It is only possible for us to offer such an opportunity to our students through the selfless contribution of the scientists in our community. We think that the people who gave of their time to help our students deserve recognition.

We would like to call your attention to the fact that Mr. Paul F. Frank from your institution participated in our Science Seminar program as a member of the Science Seminar Faculty, and sponsored a student project. We are most grateful for this help and wish that we had some more tangible way to express our appreciation than a simple "thank you".

We feel sure that you, too, appreciate the value of such civic endeavor and will accord proper recognition.

Sincerely,

LESTER J. HARMAN
Superintendent

LJH:ml

COPY

NORTH CHICAGO COMMUNITY HIGH SCHOOL
1717 Seventeenth Street
North Chicago, Illinois

October 13, 1964

Admiral F. P. Kruez
United States Naval Hospital
Great Lakes, Illinois

Dear Admiral Kruez:

May I briefly describe for you a unique program at the North Chicago High School which has been made possible by the contribution of the time and effort of some of your employees and the policies of your company permitting such school-industry cooperation.

The Science Seminar Program, now in its 7th year is made up of 25-30 young people selected carefully by testing, performance in other classes, student interest, and parent approval. They receive no credit, attend regular lectures weekly at night, present papers and studies, develop a project, and participate in the Science Fair.

We wish to call to your attention that Mr. Paul Frank of the hospital has been active in our program for three years and served in the capacity of sponsoring student projects, being a member of the Steering Committee, helping conduct field trips to Naval Research Hospital, and being a member of the Science Seminar faculty.

His contribution to this program has been appreciated by our school faculty, administration, Board of Education, community, and students. We feel fortunate in having such public spirited people in our industries and who recognize the values of such community service on the part of its employees.

The school has recognized Mr. Frank in a yearly banquet, but his other real reward comes from the satisfaction of working with young people.

Sincerely,

LESTER J. HARMAN
Superintendent

LJH:ml

DEPARTMENT OF THE NAVY
BUREAU OF MEDICINE AND SURGERY
WASHINGTON, D.C. 20390

IN REPLY REFER TO
BUMED-71:ems
8 March 1967

Mrs. Paul Frank
3869 Grand Avenue
Gurnee, Illinois 60031

Dear Mrs. Frank:

It was with deep regret that I learned of Paul's death and hasten to express my sincere sympathy. Those of us who were privileged to know him share very keenly your great personal loss.

It is my sincere hope that time and the knowledge of your late husband's wonderful contributions to the field of medical research will help to assuage your grief.

I would be pleased to hear from you if there is anything we can do to help you now or in the future.

Sincerely,

J P Pollard

J. P. POLLARD
Captain, MC, USN
Assistant Chief for Research and
Military Medical Specialties

COPY

Commission on Streptococcal
and Staphylococcal Diseases
Cleveland Metropolitan General Hospital
3395 Scranton Road
Cleveland 9, Ohio

1 May 1967

Mrs. Paul Frank
3869 Grand Avenue
Gurnee, Illinois 60031

Dear Mrs. Frank:

The Commission on Streptococcal and Staphylococcal Diseases of the Armed Forces Epidemiological Board passed the following resolution concerning the death of your husband:

> "The Commission on Streptococcal and Staphylococcal Diseases, Armed Forces Epidemiological Board, recognizes the outstanding contributions of Mr. Paul Frank of the Naval Medical Research Unit No. 4 to the control of streptococcal infections and rheumatic fever in the military services. His devoted participation for the past decade in the activities of the Committee on Prophylaxis of Streptococcal Infections in the Armed Forces has contributed materially to the reduced occurrence of rheumatic fever in the military services. His loss is felt keenly by the Commission".

As you may know, I have known your husband for a number of years and greatly appreciated his contributions to the activities of the Commission. He was always willing to do anything that we ask of him and indeed always carried it out to perfection. We all shall miss him and want to extend our sympathies to you.

Very sincerely yours,

Charles H. Rammelkamp, MD
Director, Commission on
Streptococcal and Staphylococcal
Diseases, A.F.E.B.

CHR:jhg
cc: Capt. R. O. Peckinpaugh

DEPARTMENT OF THE NAVY
BUREAU OF MEDICINE AND SURGERY
WASHINGTON, D.C. 20390

IN REPLY REFER TO
BUMED-72-CHM:ptb
7 March 1967

Mrs. Paul Frank
3869 Grand Avenue
Gurnee, Illinois 60031

Dear Mrs. Frank:

The entire Preventive Medicine Division was grieved by the news of the untimely death of your husband. Since I had the opportunity to work closely with Paul while I was Scientific Director at NAMRU-4, his death was especially saddening to me.

Paul was an outstanding researcher and an exceptionally fine person. His passing will be a loss to his many friends and to the scientific community at large.

Please accept my personal condolences and those of the entire Division.

Sincerely yours,

CHMiller

CHARLES H. MILLER
COMMANDER MC USN
Director, Preventive
Medicine Division

THE UNIVERSITY OF MICHIGAN

SCHOOL OF PUBLIC HEALTH

ANN ARBOR, MICHIGAN

DEPARTMENT OF EPIDEMIOLOGY

March 23, 1967

Captain Robert O. Peckinpaugh, MC USN
Naval Medical Research Unit No. 4
U. S. Naval Hospital
Great Lakes, Illinois 60088

Dear Captain Peckinpaugh:

It was a real regret to learn of the death of Mr. Frank. He was a staunch and effective contributor to the efforts in the field. May I express through you to his colleagues and family my sincere sympathy.

Very truly yours,

Thomas Francis, Jr.

Thomas Francis, Jr., M.D.
Professor and Chairman

TF:ebt

LETTERS OF CONDOLENCE

Charles E. Alexander, Jr.
CDR MC USN
Officer in Charge
U.S. Navy Preventive Medicine Unit No. 7

Charles H. Miller
CDR MC USN
Director, Preventive Medicine Division
Bureau of Medicine and Surgery
Washington, D.C.

J. P. Pollard
CAPT MC USN
Assistant Chief, Bureau of Medicine and Surgery
Washington, D.C.

Gordon H. Rovelstad
CAPT DC USN
Officer in Charge
Naval Dental Research Institute
Great Lakes, Illinois

George Gee Jackson, MD
Professor of Medicine
University of Illinois
College of Medicine
Chicago, Illinois

Duard L. Walker, MD
Professor of Medical Microbiology
The University of Wisconsin
Medical School
Madison, Wisconsin

Edward A. Mortimer, Jr., MD
Professor and Chairman
Department of Pediatrics
The University of New Mexico
School of Medicine
Albuquerque, New Mexico

Alvin F. Coburn, MD
Assistant Dean and Professor of Microbiology
New York Medical College
New York, New York

John R. Seal, MD
Director of Intramural Research
National Institutes of Health
Bethesda, Maryland

Max D. Moody, Ph.D.
Chief, Streptococcus Unit
Communicable Disease Center
Atlanta, Georgia

Thomas G. Ward, MD
Scientific Director
Microbiological Associates
Bethesda, Maryland

Clayton G. Loosli, MD
Hastings Professor of Medicine and Pathology
University of Southern California
School of Medicine
Los Angeles, California

Charles H. Rammelkamp, MD
Chairman, Committee on Prophylaxis
of Streptococcal Infections (AFEB
Commission on Streptococcal and
Staphylococcal Diseases)
Department of Medicine
The School of Medicine
Western Reserve University
Cleveland, Ohio

Robert B. McFarland, MD
Member, Committee on Prophylaxis
of Streptococcal Infections (AFEB
Commission on Streptococcal and
Staphylococcal Diseases)
Internal Medicine
Boulder, Colorado

R. W. Sarber
Executive Secretary
American Society for Microbiology
Ann Arbor, Michigan

Thomas Francis, Jr., MD
Professor and Chairman
Department of Epidemiology
The University of Michigan
School of Public Health
Ann Arbor, Michigan

William S. Jordan, Jr., MD
Director, Commission on Acute Respiratory Diseases
Department of Preventive Medicine
University of Virginia
Charlottesville, Virginia

SECTION II

SCIENTIFIC CONTRIBUTIONS

IN VITRO SENSITIVITY ON COLIFORM BACILLI TO SEVEN ANTIBIOTICS

Paul F. Frank, Clare Wilcox and Maxwell Finland

J. Lab. Clin. Med. 35:188-204, 1950

ABSTRACT

The results of tests for sensitivity to seven antibiotics carried out simultaneously on a number of recently isolated, pathogenic strains of Esch. coli have been presented. They serve to indicate the variations in the in vitro activity of these antibiotics with different strains of the same species. The results of similar tests with strains of A. aerogenes and K. pneumoniae also have been presented.

These data together with the results of all other tests for sensitivity to these antibiotics that have been carried out in this laboratory with strains of these organisms have been analyzed and compared.

Under the conditions of these tests, the most effective antibiotics against all of these organisms were polymyxin and aerosporin and both of these agents were about equally active. Aureomycin and chloromycetin were about equally effective against each of the species and both were appreciably less active than polymyxin and aerosporin. Streptomycin ranked with aureomycin and chloromycetin in its activity against a large proportion of the strains, but there was an appreciable number of strains of each of these organisms that was highly resistant to streptomycin. Penicillin showed the greatest variation in its in vitro effect on the different species of coliform bacilli; it was moderately effective against K. pneumoniae, less so against most strains of Esch. coli, and essentially inactive against A. aerogenes.

On the whole, the strains of K. pneumoniae were the most sensitive, those of A. aerogenes were the most resistant, while the strains of Esch. coli were intermediate in their susceptibility to all seven antibiotics.

The limitations of these in vitro data with respect to their clinical application have been discussed.

IN VITRO SENSITIVITY OF BACILLUS PROTEUS AND PSEUDOMONAS AERUGINOSA TO SEVEN ANTIBIOTICS

Paul F. Frank, Clare Wilcox and Maxwell Finland

J. Lab. Clin. Med. 35:205-214, 1950

ABSTRACT

The results of tests for in vitro sensitivity of a number of recently isolated pathogenic strains of B. proteus and Ps. aeruginosa to seven antibiotics have been presented.

The most effective agents against the majority of strains of B. proteus were chloromycetin, penicillin, streptomycin, and aureomycin, in that order. However, a significant proportion of the strains were highly resistant to penicillin and streptomycin, and rather high concentrations of aureomycin were required to inhibit most of the strains. Bacitracin was totally ineffective, and polymyxin and aerosporin were also essentially inactive. B. proteus was the only one among the common pathogenic gram-negative bacilli that were studied which was found to be resistant to polymyxin and aerosporin.

Against Ps. aeruginosa, aerosporin was the most effective and polymyxin ranked next. Streptomycin was active in moderately high concentrations against a majority of the strains, while a significant proportion were highly resistant to this agent. Aureomycin and chloromycetin were inhibitory in concentrations which, for most of the strains, are outside the range attainable clinically by systemic therapy. Penicillin and bacitracin were essentially without effect.

IN VITRO SENSITIVITY OF HUMAN PATHOGENIC STRAINS OF STREPTOCOCCI TO SEVEN ANTIBIOTICS

Maxwell Finland, Clare Wilcox and Paul F. Frank

Amer. J. Clin. Path. 20:208, 1950

ABSTRACT

Pathogenic strains of various streptococci recently isolated from cases of human infections were tested for their in vitro sensitivity to 7 antibiotics.

The strains of hemolytic streptococci were the most uniform in their sensitivity to each of the individual antibiotics and were quantitatively the most distinct in their susceptibility to the different antibiotics.

The order of effectiveness of these antibiotics against the hemolytic streptococci was: (1) penicillin, (2) bacitracin, (3) aureomycin, (4) chloromycetin, (5) streptomycin, (6) aerosporin, and (7) polymyxin.

There were significant quantitative differences in the activity of some of the antibiotics against the various kinds of streptococci as they were classified for purposes of this study. Penicillin, bacitracin and chloromycetin were most active against the strains of hemolytic streptococcus, less so against the viridans streptococci and least against the strains of enterococcus. Aureomycin and streptomycin, on the other hand, were about equally active against all three of these varieties of streptococci, aureomycin being much more effective than streptomycin.

The order of activity of the different antibiotics against both the viridans streptococci and the enterococci on a weight basis was as follows: (1) penicillin, (2) aureomycin, (3) chloromycetin, (4) bacitracin, and (5) streptomycin. Aerosporin and polymyxin were essentially inactive.

IN VITRO SUSCEPTIBILITY OF PATHOGENIC STAPHYLOCOCCI TO SEVEN ANTIBIOTICS

Maxwell Finland, Paul F. Frank and Clare Wilcox

Amer. J. Clin. Path. 20:325, 1950

ABSTRACT

Data have been presented concerning the in vitro sensitivity of pathogenic strains of staphylococci to seven antibiotics.

Penicillin was the most active of these antibiotics against about two-thirds of the strains tested, but there were wider variations in the susceptibility of the different strains to penicillin than to any of the other antibiotics studied.

Aureomycin was the most active of the other six antibiotics against almost all of the strains. Chloromycetin ranked next and was appreciably less active. Streptomycin was more active than the latter against a few of the strains, but was less effective against most of them. Bacitracin was appreciably less active than streptomycin, and aerosporin was inhibitory only in high concentrations, while polymyxin was ineffective in the highest concentrations used.

Strains of staphylococci isolated and tested before 1946 were inhibited by significantly lower concentrations of penicillin than those required for strains isolated subsequently.

THE USE OF TRIETHYLENE GLYCOL VAPOR FOR CONTROL OF ACUTE RESPIRATORY DISEASES IN NAVY RECRUITS
I. Physical Factors and the Effect of Air-borne Bacteria

Personnel of Naval Medical Research Unit No. 4 (Paul F. Frank)

Amer. J. Hyg. 55:203-229, 1952

ABSTRACT

Saturation of the air of Navy recruit dormitories with triethylene glycol can be easily maintained by a simple vaporizer installation.

During the winter months the temperature and humidity in recruit dormitories at the United States Naval Training Center, Great Lakes, are within the ranges at which triethylene glycol has been shown to rapidly kill bacteria and viruses.

Triethylene glycol vapor causes a marked reduction of air-borne bacteria in Navy recruit barracks and the reduction is enhanced by dust suppressive measures.

Triethylene glycol vapor alone or in conjunction with oiling of floors does not eliminate the agitation of particles carrying viable pathogens into the air of recruit dormitories.

GLUCURONIDASE PRODUCTION BY STREPTOCOCCUS PYOGENES

John J. Robinson, Charles W. Blinn and Paul F. Frank

J. Bact. 64:719-723, 1952

ABSTRACT

Methods for testing streptococci for glucuronidase production are presented. A micro technique has proved efficient, accurate, and economical. Of 2,491 strains of Streptococcus pyogenes studied for glucuronidase production, 1.2 per cent of group A typable strains produced the enzyme. Group A nontypable strains, nonbroupable strains, and groups C and G had a much higher incidence of the enzyme. Group A, typed strains isolated from four patients during an acute pharyngitis followed by rheumatic fever did not produce glucuronidase. Rheumatic fever was not associated with any of the glucuronidase-positive, typable group A streptococci encountered.

FURTHER STUDIES ON BETA-GLUCURONIDASE PRODUCTION BY STREPTOCOCCUS PYOGENES

Paul F. Frank and Arthur L. Leppen

Report to the Bureau of Medicine and Surgery, Navy Department, Washington, D.C., No. NM 005 051.14.07, 2 Dec 1953

ABSTRACT

Four of thirty-eight strains of group A streptococci isolated from children attending a rheumatic fever clinic exhibited beta-glucuronidase activity. None of these strains were associated with the subsequent development of recurrent rheumatic fever. Twenty-three strains of group A streptococci isolated from Navy recruits prior to the development of active rheumatic fever were also studied. None of these produced beta-glucuronidase.

From this study no evidence was obtained to suggest that beta-glucuronidase production by typable group A streptococci is of any value in the detection of strains of streptococci possessing peculiar capacities for precipitating active rheumatic fever.

STUDIES ON THE PATHOGENICITY OF STREPTOCOCCUS PYOGENES IV. THE RELATION BETWEEN THE CAPACITY TO INDUCE FATAL RESPIRATORY INFECTIONS IN MICE AND EPIDEMIC RESPIRATORY DISEASES IN MAN

A. F. Coburn, P. F. Frank and Jean Nolan

British J. Exper. Path. 38:256-267, 1957

ABSTRACT

The findings indicate that: (a) freshly isolated cultures of Streptococcus pyogenes associated with the induction of an epidemic in man have mouse infectivity; (b) the aerosol spray method described for the Swiss albino mouse is suitable for screening streptococci with potential epidemicity for man.

Throughout a 2-year period, the only streptococcal strains recovered within a Navy Recruit Training population showing mouse infectivity were type 19 organisms. These organisms gave rise to two streptococcal epidemics.

The epidemiological and laboratory observations together lend further support to the concept that the induction of streptococcal naso-pharyngeal infection is not purely a matter of the quantity of micro-organisms inhaled, but is determined, in part, at least, by qualitative differences in the bacteria contaminating the air.

The induction of streptococcal respiratory tract disease in the mouse appears to be dependent on an environmental as well as a bacterial factor. The possible nature of this environmental factor and some of its implications on the pathogenesis of human respiratory disease are discussed.

FURTHER STUDIES ON THE PROPHYLAXIS OF STREPTOCOCCAL INFECTIONS WITH ORAL PENICILLIN

John R. Seal and Personnel of Naval Medical Research Unit No. 4 (Paul F. Frank)

Report to the Bureau of Medicine and Surgery, Navy Department, Washington, D.C., No. NM 005 051.15.02, 7 June 1954

ABSTRACT

During the winter of 1951-52 a number of studies were made on the prophylaxis of streptococcal infections with oral penicillin. Doses of 50,000 and 100,000 units of penicillin daily were about equally effective in preventing uninfected men from acquiring the prevalent strains of streptococci but, even when continued for several weeks, were relatively ineffective in eradication of streptococci from carriers. A dose of 125,000 units three times daily for 10 days was highly effective in rendering the nose and throat cultures of carriers free of beta hemolytic streptococci and somewhat more effective in preventing men from acquiring new strains of this organism than were smaller doses.

Large scale prophylaxis was conducted because of an epidemic of streptococcal infections. The epidemic was suppressed during the period of penicillin administration and for a slight period following its termination. The incidence of hypersensitivity reactions to penicillin was negligible.

ANTIBIOTIC TREATMENT OF STREPTOCOCCAL EXUDATIVE TONSILLITIS OR PHARYNGITIS IN NAVY RECRUITS

R.W. Weber, J.R. Seal and Personnel of Naval Medical Research Unit No. 4 (Paul F. Frank)

Report to the Bureau of Medicine and Surgery, Navy Department, Washington, D.C., No. NM 005 051.10.02, 17 June 1954

ABSTRACT

A total of 308 patients with streptococcal exudative tonsillitis or pharyngitis were studied during the winters of 1951 and 1952. One-third of these patients were treated with 300,000 units of aqueous crystalline penicillin G and 300,000 units of aqueous procaine penicillin at 12, 24, and 36 hours, and 600,000 units of procaine penicillin G in oil with 2 per cent aluminum monostearate, at 48 hours. Another third received no antibiotics. In 1951, the remaining third received various other penicillin regimens. All patients were followed for at least 20 days after admission. All penicillin regimens were effective in hastening recovery and had their most marked effects on fever and leukocytosis.

The divided dose regimen was the most effective therapy, but 7 per cent of patients continued to harbor the infecting type of streptococcus after treatment and significant antistreptolysin O titer increases occurred in 40 to 60 per cent of patients.

INCIDENCE OF SULFONAMIDE RESISTANT STREPTOCOCCAL STRAINS ISOLATED OVER A SIX YEAR PERIOD EMPLOYING A DEHYDRATED FORM OF WILSON'S SR MEDIUM

John Sprague and Paul F. Frank

Report to the Bureau of Medicine and Surgery, Navy Department, Washington, D.C., No. NM 005 051.14.15, 12 April 1955

ABSTRACT

A dehydrated form of Wilson's medium for determining sulfonamide resistance of hemolytic streptococci was tested against eighteen (18) strains of group A streptococci with known levels of sulfadiazine resistance. The medium allowed quick and reproducible sulfa determinations with a minimum of effort. Employing this medium to test sulfadiazine resistance of five hundred twenty-three (523) streptococcal strains isolated over a six year period revealed that only six were resistant to 5 mgs/100 or greater. Five of these strains belonged to Lancefield's group A of which four (4) were type 5 and one not typable. One strain proved to belong to group C.

DIFFERENTIATION OF GROUP A FROM OTHER BETA HEMOLYTIC STREPTOCOCCI WITH BACITRACIN

M. L. Levinson and P. F. Frank

J. Bact. 69:284-287, 1955

ABSTRACT

The observation by Maxted that beta hemolytic streptococci belonging to group A can be easily differentiated from nongroup A strains by the use of bacitracin impregnated filter paper on the surface of inoculated blood agar plates has been confirmed.

Growth of all or nearly all strains of group A streptococci is inhibited by a concentration of 1 unit of bacitracin per ml. This concentration will also inhibit about 7 per cent of strains belonging to other groups.

The method is simple and has few sources of error compared to potential sources inherent in methods for serological differentiation.

It is recommended for use in laboratories where serological methods cannot be carried out and will be of help to those laboratories which need to differentiate large numbers of strains.

THE EPIDEMIOLOGY OF BETA HEMOLYTIC STREPTOCOCCI AMONG NAVY RECRUITS. I. THE ROLE OF THE NEW RECRUIT IN STREPTOCOCCAL EPIDEMICS

P.F. Frank, M.L. Levinson, C. Kasper, O. Beaman,
T.L. Sidener, J.R. Boczek, D.E. Kastner and J.V. Kramer

Report to the Bureau of Medicine and Surgery, Navy Department,
Washington, D.C., No. NM 005 051.04.04, 1 June 1955

ABSTRACT

During the winter of 1953-54, cultures for beta hemolytic streptococci were obtained from 4,450 Naval recruits upon their arrival at the Great Lakes Naval Training Center, and again during their first and third week of training, after assignment to a training company.

Streptococci were frequently isolated among the recruit population beginning in February 1954 and reached epidemic proportion during the second week in April. At this time 250,000 units of penicillin G were administered orally twice daily for a period of 10 days with a resultant rapid decline in both respiratory disease admission and streptococcal isolation rates.

Cultural data obtained from recruits arriving at Great Lakes, at company surveys during the first and third week of training, and at the regimental infirmary, failed to support the premise that the type 19 epidemic strain was introduced into the recruit population via incoming recruits and that these men were responsible for the type 19 epidemic in the winter of 1953-54.

Limited bacteriological data on other groups of recruits housed near to and assigned along with the new recruits into training companies, failed to indicate that during the period of study, the epidemic strain gained admission to the recruit population by this route.

It was concluded from this study that the Receiving Unit was not the ideal place to institute a penicillin prophylaxis program for the prevention of streptococcal epidemics. A more fruitful approach to the problem might be found through a diligent search among recruits in training for vulnerable points in the transmission of streptococci where penicillin prophylaxis might be directed more effectively.

THE PROPHYLAXIS OF ACUTE RESPIRATORY INFECTIONS WITH ORAL PENICILLIN OR CHLORTETRACYCLINE

Personnel of Naval Medical Research Unit No. 4 (Paul F. Frank)

Antibiotics Annual 1953-1954, Medical Encyclopedia, Inc., New York, N.Y., pp. 123-136

ABSTRACT

During an epidemic of streptococcal and other respiratory infections daily oral doses of 100,000 units of penicillin, 250 mg of chlortetracycline, or a placebo capsule were administered to Navy recruits. Both agents were effective in the prevention of streptococcal infections during the period of administration. Neither antibiotic altered significantly the number of nonstreptococcal respiratory infections, although an unexplained decrease in the number of serologically diagnosed cases of influenza occurred in the chlortetracycline-treated group. Hypersensitivity reactions to penicillin or chlortetracycline were not encountered. A remarkably large percentage of chlortetracycline-treated men developed a mild diarrhea which subsided spontaneously despite continued treatment. There were no major changes in the nose or throat flora as a result of antibiotic prophylaxis. Penicillin- and chlortetracycline-resistant strains of staphylococci were isolated with greater relative frequency from men receiving these antibiotics than from the placebo group.

ISOLATION AND REVERSION OF L FORMS OF BETA-HEMOLYTIC STREPTOCOCCI

York E. Crawford, Paul F. Frank and Betty Sullivan

J. Infect. Dis. 102:44-52, 1958

ABSTRACT

L colonies were isolated from 14 strains of beta-hemolytic streptococci upon exposure to penicillin in solid media containing high concentrations of sodium chloride. The concentration of this electrolyte was a critical factor for the development and survival of the L forms. Strains of streptococci which failed to yield the L forms upon first exposure to penicillin usually produced them when a "blind transfer" technic was employed. Beta-hemolytic streptococci of the original serological group and type were regained from the L colonies of 9 out of 11 strains. The medium and technic employed to recover the streptococcus from its L form has been described. A supplement of yeast extract apparently has favored the recovery of streptococci from their L forms.

STREPTOCOCCAL PROPHYLAXIS IN NAVY RECRUITS WITH ORAL AND BENZATHINE PENICILLIN

Paul F. Frank

Armed Forces Medical Journal 9:543-560, 1958

ABSTRACT

During the winter of 1955-1956, approximately 26,000 Navy recruits at this training center underwent a penicillin prophylactic program against streptococcal disease. About one-half received 157 mg (250,000 units) of buffered oral penicillin G twice daily for 10 days and once daily for an additional 30 days, while the other half received a single injection of 495 mg (600,000 units) of benzathine penicillin shortly after arrival at the training center. The oral preparation was employed in recruits "on-board" as of 21 January 1956, while benzathine penicillin was used in recruits entering training as of 18 January through 27 April 1956.

Although an overt streptococcal epidemic was prevented, 33 cases of rheumatic fever did occur in the recruit population as a result of streptococcal infections experienced prior to prophylaxis.

With the exception of one recruit, no positive cultures for group A streptococci were obtained in the benzathine penicillin-treated men until 28 or more days after injection, and only 0.4 per cent of men receiving the oral preparation showed positive cultures in the 40-day-oral prophylactic period.

In spite of this rather intensive penicillin prophylactic program, eradication of the epidemic type of streptococci from the recruit population was not accomplished, and a small streptococcal outbreak occurred near the conclusion of the study. Possible reasons for the failure to eradicate are discussed, and compensatory measures recommended.

Only 0.07 and 0.39 per cent of men receiving oral or benzathine penicillin, respectively, were hospitalized for hypersensitivity reactions. Reactions from benzathine penicillin were more severe than those from the oral preparation.

STUDIES ON THE ALTERATION OF PENICILLIN RESISTANCE AMONG STAPHYLOCOCCI EMPLOYING ANTIPENICILLINASE-IMMUNE SERUM

Paul F. Frank and P. McGuigan

Bacteriological Proceedings-1959, No. M19, p. 62.

ABSTRACT

One important mechanism by which bacteria resist penicillin inhibition is the production of penicillinase. Early studies have shown that injection of the enzyme into the rabbit elicited antibody which had the capacity to inhibit penicillinase activity as well as precipitate the enzyme. In vitro studies on the efficacy of antipenicillinase-immune serum to reduce penicillin resistance have been met with partial but not significant success. In vivo studies limited to experimental mixed infections revealed that the penicillinase produced by a resistant strain was neutralized by the immune serum so that successful penicillin therapy of the susceptible strain was accomplished. It was only in this capacity that antipenicillinase-immune serum treatment was thought to be useful. In the present investigation, antibody has been produced in the rabbit by both intravenous and subcutaneous injection of a purified enzyme preparation (Neutrapen-Schenlab.). The antibody obtained has altered penicillin resistance from more than 1000 unit/ml to less than 1 unit/ml of penicillin in some strains of staphylococci. Other strains, however, appear not to be effected. Whether this is due to immunologically different penicillinases among staphylococcal strains or to the production of larger amounts of the enzyme are not known at present. Preliminary results of in vivo experiments have shown that the immune serum has the capacity to protect penicillin-treated mice against fatal staphylococcal septicemia while normal serum control mice succumbed despite penicillin therapy.

THE STREPTOCOCCI. DIAGNOSTIC PROCEDURES AND REAGENTS

A.T. Wilson, P.F. Frank, W. Hollinger, A.G. Kuttner, R.C. Lancefield, M. McCarty, C.H. Rammelkamp, L.A. Rantz and E. Updyke

APHA, Chapter 5, 1960, pp. 187-206

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STREPTOCOCCUS INFECTIONS

I. Introduction

Cultivation of streptococci
Fluid Media
Blood agar

II. Collection and preparation of specimens

A. Blood
B. Anterior nasal, nasopharyngeal and throat specimens
C. Pus, sputum, cerebrospinal fluid, discharges, exudates, urine
D. Milk

III. Bacteriological examination

Blood agar plates

IV. Serological identification

Capillary pipette grouping
Capillary pipette typing of group A streptococci

V. Evaluation and reporting of results

References

INTERDEPENDENCE OF HYALURONIC ACID AND M PROTEIN IN STREPTOCOCCAL AEROSOL INFECTIONS IN MICE

J. T. Custod, R. L. Lytle, B. H. Johnson and P. F. Frank

Proc. Soc. Exper. Biol. Med. 103:751-753, 1960

ABSTRACT

Of the 16 group A streptococcal strains tested, only 9 exhibiting type-specificity and production of hyaluronic acid possessed capacity to induce aerosol infections in mice. Conversely, the remaining 7 strains which lacked either one or the other of these attributes failed to demonstrate infectivity by aerosol challenge. A statistically significant relationship between HA production and mouse infectivity was observed.

ANTAGONISTIC EFFECT OF A PENICILLINASE-PRODUCING STAPHYLOCOCCUS ON PENICILLIN THERAPY OF A STREPTOCOCCAL THROAT INFECTION

Paul F. Frank and L. F. Miller

Bacteriological Proceedings-1960, No. M53, p. 103

ABSTRACT

Evidence for interference in penicillin therapy of a susceptible microorganism by the presence of a penicillinase-producing resistant staphylococcus has previously been shown experimentally and inferred in clinical experience. This report presents evidence of the persistence of a penicillin-sensitive group A streptococcus type 6 in the presence of a penicillinase-producing, coagulase positive staphylococcus phase type VA, despite a prolonged period of intensive therapy with oral penicillin. Evidence for the persistence of the streptococcus was obtained by culturing as many as four times a day throughout the 23-day period of observation. Blood levels were observed 20 to 60 times the in vitro sensitivity of the streptococcus. That this failure to eradicate was not due to some inherent host factor is suggested by the fact that a streptococcal infection in this patient due to a type 25 streptococcus was successfully treated with oral penicillin in smaller doses two weeks before. This prior treatment might have resulted in a condition conducive to the emergence or acquisition of the penicillin-resistant staphylococcus observed in the second infection. It is suggested that in cases where there is an apparent failure in penicillin therapy of a penicillin-sensitive microorganism, a search be made for penicillinase-producing bacteria. A more important application of this experience can be realized in the prophylaxis of rheumatic fever where a routine check for penicillinase-staphylococci as well as a search for beta hemolytic streptococci should be made, since a break in effective penicillin protection might prove disastrous.

ANTAGONISTIC EFFECT OF A PENICILLINASE-PRODUCING STAPHYLOCOCCUS ON PENICILLIN THERAPY OF A STREPTOCOCCAL THROAT INFECTION

Paul F. Frank and L. F. Miller

Amer. J. Med. Sci. 243:90/582-93/585, 1962

ABSTRACT

Observations were made on the persistence of a penicillin-sensitive group A streptococcus in the presence of a penicillinase-producing coagulase-positive staphylococcus in the throat of a patient with a mild respiratory illness. The patient received as much as 1.8 gm of oral penicillin G a day.

Extensive laboratory data obtained over the 23 days of observation revealed persistence of the same two organisms in spite of penicillinemia 20 to 60 times that required for *in vitro* inhibition. Both the staphylococcus and streptococcus were eradicated from the patient's throat when penicillin was discontinued and erythromycin therapy instituted.

The possible role of the penicillinase-producing staphylococcus as well as other reasons for streptococcal persistence are discussed. A practical implication of this phenomenon is pointed out.

EFFECT OF PROPHYLACTIC PENICILLIN ON STAPHYLOCOCCI

Paul F. Frank and Lloyd F. Miller

Arch. Int. Med. 110:596-605, 1962

ABSTRACT

Staphylococci were isolated from 1, 526 nasal cultures made from 629 U.S. Navy recruits before and after the prophylactic administration of a single injection of 1, 200, 000 units of benzathine penicillin G.

Studies on frequency of staphylococcal isolation, carriage, and acquisition of these strains, as well as distribution of phage types and occurrence of antibiotic resistance, failed to reveal any evidence of emergence or spread of potentially pathogenic strains of staphylococci in the recruit population as a result of penicillin prophylaxis.

Although isolation rates for penicillin-resistant strains were increased soon after administration of penicillin early in training, prepenicillin rates were reestablished 7 weeks later.

THE EFFECTS OF PHYSICAL ACTIVITY AND SITE OF INJECTION ON PENICILLINEMIA FOLLOWING ADMINISTRATION OF 1.2 MILLION UNITS OF BENZATHINE PENICILLIN G

W. M. Lukash and P. F. Frank

Amer. J. Med. Sci. 246:87/429-96/438, 1963

ABSTRACT

The effects of physical activity and site of intramuscular administration of 1,200,000 units of benzathine penicillin G on the duration of detectable serum penicillin levels were studied. An active naval recruit population was compared with a less active hospitalized population. The two areas of injection evaluated were the traditional posterior-buttocks site and the anterior gluteal region.

The duration of penicillin in the serum specimens was one-third to one-half as long as those reported in other nonrecruit populations. The more active group had a longer penicillinemia than the less active, hospitalized group, but only with the posterior site of injection. Various reasons for this phenomenon are discussed.

The anterior intramuscular approach resulted in higher initial penicillin levels, but the duration of penicillin in the serum was less than that obtained with the conventional "posterior site". There was more pain on sitting with the posterior injection site.

IN VIVO AND IN VITRO RESISTANCE TO SULFADIAZINE IN STRAINS OF NEISSERIA MENINGITIDIS

J. W. Millar, E. E. Siess, H. A. Feldman, C. Silverman
and
P. F. Frank

JAMA 186:139-141, 1963

ABSTRACT

Our conclusions are in the form of a warning. After 24 years of using sulfonamides as a specific prophylaxis against meningococcal disease, a period during which physicians have been so satisfied with the results of such prophylaxis that they have rarely tested meningococci for antibiotic sensitivity, a group B strain of Neisseria meningitidis has been recovered from Navy recruits who have had clinical disease or who have been healthy carriers of the organism. It is probable that such a strain has come from a civilian community somewhere in the US. No strains from nonmilitary personnel have yet shown decreased sensitivity to sulfadiazine. Physicians must suspect meningococcal disease whenever patients present with a high fever and a peculiar rash; they must act rapidly to obtain recovery of the patient. Their treatment must reflect their awareness of the existence of sulfonamide-resistant strains of meningococci. All medical personnel throughout the country are urged to search for these strains. Antibiotic sensitivity should be determined by a serial dilution method to obtain a more accurate estimate of the level of bacterial sensitivity. Strains suspected of antibiotic resistance should be sent to municipal, state, or federal public health laboratories for confirmation.

INFECTIOUS AGENTS ASSOCIATED WITH CYLINDRICAL BRONCHIECTASIS

M.W. Rytel, G.H. Conner, C.C. Welch, W.H. Kraybill, E.A. Edwards, M.J. Rosenbaum, P.F. Frank and L.F. Miller

Diseases of the Chest 46:23-28, 1964

ABSTRACT

In view of a relatively high incidence of cylindrical bronchiectasis as a complication of bronchopneumonias in Naval recruits, a study was undertaken on the infectious agents associated with this form of bronchiectasis. Isolation data from specimens obtained in 173 cases by bronchoscopy (including 108 cases of cylindrical bronchiectasis), were presented. Only two viral isolations, both of influenza B, were made in two cases of bronchiectasis. Adenovirus-antibody geometric mean titers were highest in cases of bronchiectasis (5.2), and lowest in non-pulmonary conditions (2.0). The incidence of patients with antibody titers against adenovirus of 1:64 and greater was 46.1 per cent in bronchiectasis, 27.0 per cent in bronchopneumonia ($P = <0.03$), 16.7 per cent in chronic bronchitis, and none in the other conditions. Hemophilus influenzae was isolated only in bronchiectasis (5.5 per cent), whereas, oral commensals were present almost universally. Statistically significant ($P = <0.03$) difference in isolation incidence of anaerobic mycoplasma was found between patients with bronchiectasis (32.5 per cent), and those with bronchopneumonia (14.3 per cent). There was no evidence of Eaton agent infection in the population studied.

PROTECTION OF A MILITARY POPULATION FROM RHEUMATIC FEVER

Paul F. Frank, Gene H. Stollerman and Lloyd F. Miller

JAMA 193:775-783, 1965

ABSTRACT

Types of prophylaxis programs employing benzathine penicillin G for the control of streptococcal disease among Navy recruits ranged from mass injections of penicillin in an attempt to interrupt epidemics to the year-around administration of a single injection to new recruits coming to Great Lakes, Ill., in an effort to prevent epidemics. The latter proved to be the most feasible program for the streptococcal disease situation at Great Lakes. Most programs were over 90% effective. Untoward reactions to benzathine penicillin G occurred in less than 1% of the recruits and were of the serum-sickness type. No anaphylactic deaths were observed among the 315,000 men receiving the drug prophylactically over a nine-year period.

THAYER-MARTIN SELECTIVE MEDIUM FOR THE CULTIVATION OF *NEISSERIA MENINGITIDIS* FROM THE NASOPHARYNX

J.D. Thayer, P.F. Frank and J.E. Martin, Jr.

Amer. J. Pub. Health 55:923-927, 1965

ABSTRACT

A medium is described which permits cultivation of *N. meningitidis* while selectively inhibiting most organisms constituting the normal flora of the nasopharynx, especially the saprophytic Neisseria. The use of Thayer-Martin selective medium in this study increased the detection of meningococcal carriers by 50 per cent and allowed direct typing from the primary isolation plates.

EPIDEMIOLOGY AND PREVENTION OF ACUTE RESPIRATORY DISEASE IN NAVAL RECRUITS. I. Ten Years' Experience with Microbial Agents Isolated from Naval Recruits with Acute Respiratory Disease

M.J. Rosenbaum, E.A. Edwards, P.F. Frank, W.E. Pierce, Y.E. Crawford and L.F. Miller

Amer. J. Pub. Health 55:38-46, 1965

ABSTRACT

Ten years' experience with agents related to respiratory disease at Great Lakes, Ill., have indicated the relative endemicity of adenovirus and streptococcal agents.

Influenza virus types have changed antigenically throughout the years, but the appearance of either influenza A or B has occurred with almost yearly frequency and especially during late winter or early spring. These outbreaks have invariably resulted in sharp rises in ARD rates, but have had little effect on pneumonia incidence.

Adenovirus, on the other hand, is almost invariably associated with ARD and sometimes appears to be involved with pneumonia. Beta hemolytic group A streptococci outbreaks also appear to have caused elevated ARD rates. Both the isolation of these agents and ARD incidence is lowered by mass penicillin prophylaxis.

Agents such as rhinovirus and mycoplasma undoubtedly also contribute toward the over-all ARD and (with the latter) pneumonia incidence.

However, it is the interrelation of all these agents and perhaps others in the causation, severity, and kind of illness that occurs that should be the concern of future studies and not merely the delineation of all the possible agents that may occur in a given population.

A LABORATORY MANUAL OF BACTERIOLOGICAL PROCEDURES USED IN THE IDENTIFICATION OF BETA HEMOLYTIC STREPTOCOCI

Paul F. Frank and M. L. Levinson

Report to the Bureau of Medicine and Surgery, Navy Department, Washington, D.C., No. MR 005.09-1300.1, January 1966 (revised)

ABSTRACT

This is a laboratory manual describing the bacteriological and serological procedures used in the identification of beta hemolytic streptococci. This manual is designed to aid the laboratory technician in setting-up a laboratory for the identification of beta hemolytic streptococci. Throughout the manual attention is drawn to the pitfalls commonly encountered by personnel not familiar with the beta hemolytic streptococci.

ANTIBIOTIC PROPHYLAXIS OF CARRIERS OF SULFADIAZINE-RESISTANT MENINGOCOCCI

J. M. Dowd, D. Blink, C.H. Miller, P. F. Frank and W.E. Pierce

J. Infect. Dis. 116:473-480, 1966

ABSTRACT

The use of 4 antibiotics in an attempt to reduce the carrier state of sulfadiazine-resistant meningococci is reported. Oxytetracycline and erythromycin were more effective than oral potassium penicillin G in suppressing the isolation of meningococci from the nasopharynx during the treatment period, but neither led to permanent eradication of the organisms. In a separate controlled trial ampicillin was superior to oral penicillin G in reducing the carrier state during treatment. None of these antibiotics produced results as favorable as those previously reported with the use of sulfonamides against sulfadiazine-sensitive meningococci. The importance of typing and sulfonamide sensitivity testing of meningococci is stressed and the relative merits of various prophylactic measures are discussed.

TETRAMETHYLDIPICRYLAMINE---A NEW ANTIBACTERIAL AGENT

T. S. Meyer, C. E. Moore and P. F. Frank

Nature 215:312, 1967

ABSTRACT

Tetramethyldipicrylamine (3, 3', 5.5' tetramethyl-2, 2', 4.4', 6, 6'-hexanitrodiphenylamine) which has previously shown anti-tumour activity was studied for its capacity to inhibit Gram-positive microorganisms and several strains of sulphadiazine-resistant Neisseria meningitidis. When used in concentrations of 10 μg/ml, it inhibited the following microorganisms: Staphylococcus aureus, S. epidermidis, Streptococcus mitis, S. salivarius, Bacillus subtilis and B. sterothermophilis. A variety of Gram-negative bacilli were not inhibited at 50 μg/ml. However, 14 strains of Neisseria meningitidis groups B and C (both sulphadiazine-resistant and sensitive) were inhibited in drug concentrations from 0.06-0.5 μg/ml. No biological activity was found against severe fungal or protozoan species.

RESEARCH CLERKSHIP REPORTS

AND

HIGH SCHOOL SCIENCE SEMINAR PROJECT REPORTS

Paul F. Frank (Preceptor)

1961 - 1966

EVALUATION OF A MICROTECHNIQUE FOR DETERMINING ERYTHROMYCIN BLOOD LEVELS

1961

Ens. William B. Shea, USNR
University of Ottawa Medical School
Ottawa, Kansas

THE EFFECT OF BICILLIN ON MENINGOCOCCUS CARRIAGE RATES

1962

Ens. Warren B. Howe, USNR
Washington University School of Medicine
St. Louis, Missouri

THE SEROLOGIC CLASSIFICATION OF EIGHT STRAINS OF GROUP K STREPTOCOCCI

1962

Ens. Stanley G. Norman, USNR
University of South Dakota Medical School
Vermillion, South Dakota

TEST FOR MENINGOCOCCAL AGGLUTININS IN SERA OF NAVAL RECRUITS

1963

Ens. Walter T. Young, Jr., USNR
University of Colorado School of Medicine
Denver, Colorado

DETECTION AND STUDY OF ANTIBODIES TO PENICILLIN EMPLOYING THE HEMAGGLUTINATION TEST

1964

Ens. C. A. Juhala, USNR
University of North Dakota
Grand Forks, North Dakota

SULFADIAZINE-RESISTANT *NEISSERIA MENINGITIDIS*

1965

Ens. Charles S. Brook, USNR
University of Missouri Medical School
Columbia, Missour

STUDIES ON THE MECHANISMS OF SULFADIAZINE RESISTANCE AMONG MENINGOCOCCI

1966

Ens. Hurlis V. Graham, Jr., USNR
University of Arkansas Medical School
Fayetteville, Arkansas

STUDIES ON PENICILLIN ANTIBODIES EMPLOYING THE HEMAGGLUTINATION-INHIBITION TEST

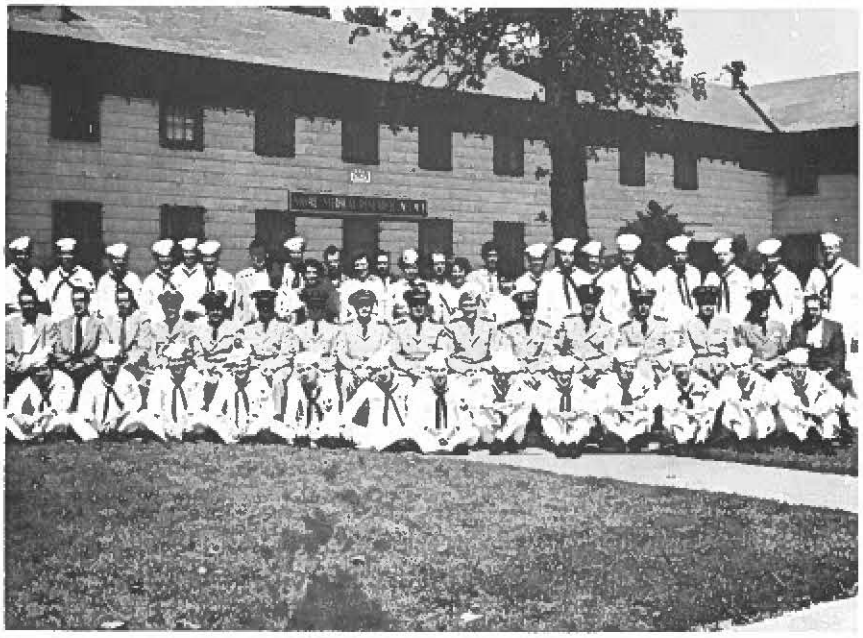
1964-1965

Lynne Hunt
North Chicago Community High School
North Chicago, Illinois

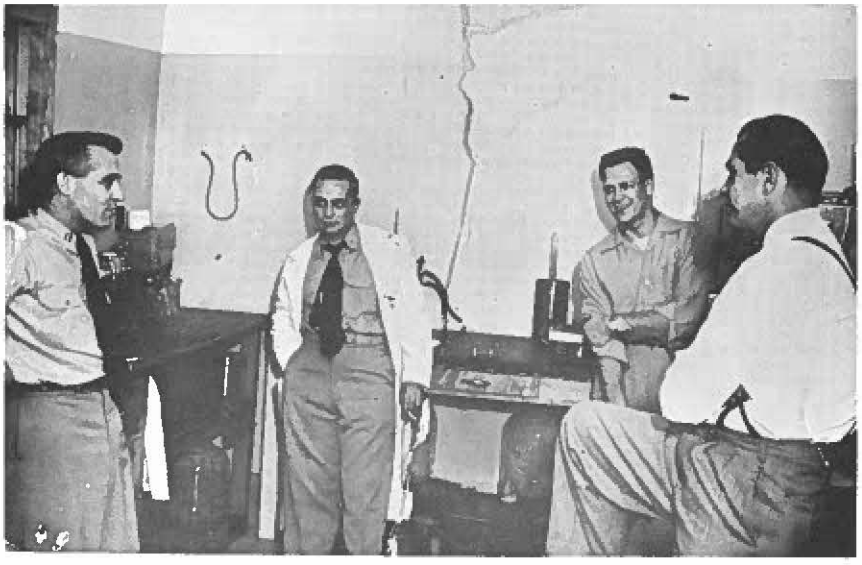
SECTION III

HISTORICAL PICTORIAL

REVIEW



Group picture, NAMRU-4, Aug. 1951. **2nd row, l-r:** Stille, Woolridge, Frank, Green, Smith, Gydostick, Weber, Curtiss Seal, Gibbons, Ziegra, Lytle, Goerner, Turner, Donovan Robinson. **Back row, l-r:** Civilians: Levinson, Kasper, DeMeio, Blinn, Crawford.

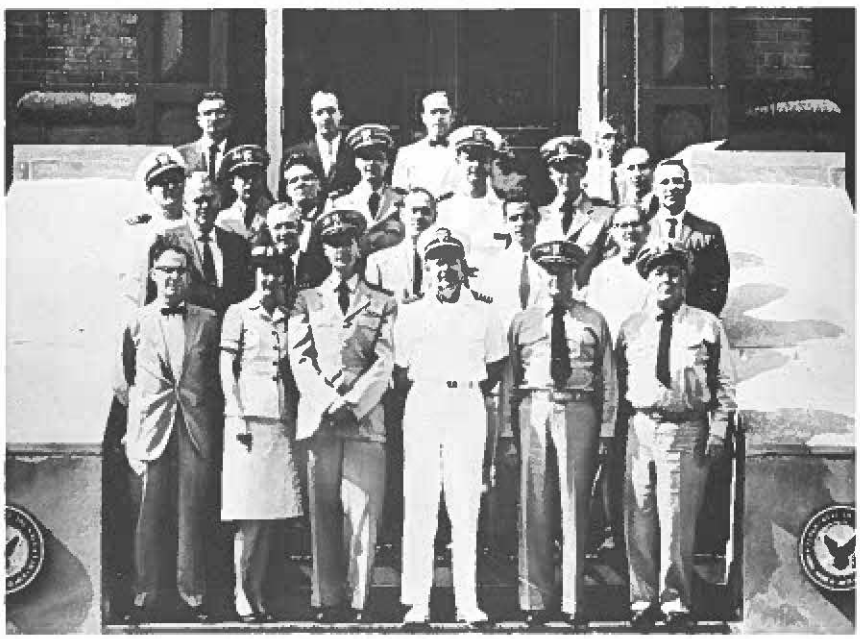


Informal "Bull" session, Bldg. 2909, 1951. Dr. W. C. Schmidt, W. Mogabgab, Wm. Gilardi and Mr. Frank.

Farewell Dinner for Capt. H. K. Sessions, OIC, NAMRU-4, Oct. 1955. **Top row, l-r:** Littlejohn, Smith, Pierce, Phillips, Wilson, Freeman, Smith, Moy, Peterkin, Boczek. **3rd row, l-r:** Rich, Danielson, Egner, Herbert, Rosenbaum, Stille, Chapman, Marquis O'Neil. **2nd row l-r:** Sampson, Duggan, Johnson, Bonds, Hunnel, Friedman, Kelly, Pelon, Mogabgab. **Front row l-r:** Simpson, Mr. Frank, Woolridge, Whiteside, Capt. Sessions, Dr. Seal.

Completion of Conference Leadership Course, Great Lakes, Illinois, 1958. l-r: Mr. Frank, Y. E. Crawford, and L. F. Miller, OIC, NAMRU-4.

Nominee for Most Outstanding Federal Civilian Professional Employee of the Year, Pick-Congress Hotel, Chicago, Ill., May 24, 1961. **l-r:** Dr. Samuel Andelman, Commissioner of Health, City of Chicago, Mr. Frank and other nominees.



Navy Conference on Acute Respiratory Diseases, 12-13 July 1962. **Top row, l-r:** Crawford, Edwards, Mr. Frank, Pierce. **Third row, l-r:** Peckinpaugh, Forsyth, Ward, Arm, Rytel, Arlander, Wagner Stollerman. **Second row l-r:** Davenport, Slade, Lytle, Rosenbaum, Winzler. **Bottom row, l-r:** Walker, DeBerry, Schlang, Miller, Calvy, Coffman.

Commendation from the Secretary of the Navy for Dr. T. Arlander, May 1965. **Front row, l-r:** Miller, Admiral Yaeger, Dr. Arlander, Admiral Kreuz, DeBerry, Dowd. **Back row, l-r:** Morrison, Edwards, Walters, Mr. Frank, Miller.

Visit by Sir Christopher Andrews, World Famed British Virologist, May 1964. **Front row, l-r:** Miller, Sir Christopher, Peckinpaugh, Dowd, Pierce. **Back row, l-r:** Mr. Frank, Lytle, Rosenbaum, Edwards, Crawford, Beno.

Departure of HM3 Green for OCS, 1964. I-r: Capt. Peckinpaugh, HM3 Green, Mr. Frank, HMC Patterson.

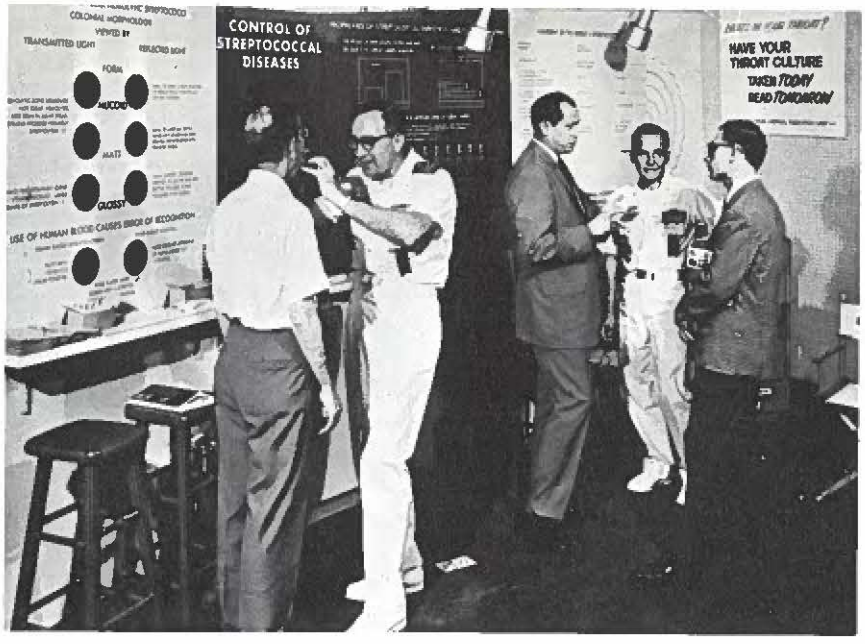
Letters of Appreciation from NCCHS for NAMRU-4 scientists associated with High School Science Seminar Program, Dec. 1964. I-r: Lytle, Edwards, Capt. Peckinpaugh, Mr. Frank and Dr. Rosenbaum.

Visit by Dr. Alvin Coburn, World Famed Rheumatologist, 1965. I-r: Mr. Frank, Dr. Coburn and Capt. Peckinpaugh.

Farewell Luncheon for Dr. Eugene Stollerman, Consultant to NAMRU-4 and USNH, 1965. I-r: Dr. Frazier, Dr. Jacoby, Dr. Peckinpaugh, Dr. Stollerman, Mr. Frank and Dr. Barnwell.

Award winning NCCHS Science Seminar student, Miss Lynn Hunt, under the Preceptorship of Mr. Frank, Feb. 1965. **l-r:** Miss Hunt, Mr. Frank and Mr. Siplon, AO, NAMRU-4.

Visit by Egyptian doctors to Bacteriology Dept. to learn streptococcal technics, Sept. 1965. **l-r:** Dr. Sorour, Mr. Frank and Dr. Kholy.



Streptococcal and Rheumatic Fever Exhibit, AMA Convention, N.Y.C., 1965.

Visit by Dr. W. Sarles, Pres. of the American Society for Microbiologists, March 1966. l-r: Dr. Sarles, Dr. Rosenbaum, Mr. Frank.

Visit by Dr. John R. Seal, March 28, 1966. l-r: Mr. Frank, Cdr. Howard, Dr. Seal and Mr. Pierce.

Visit by Cdr. Irv Green, OIC, NBL, April 1966.

Lake County Medical Assoc. Dinner at Navy Hospital and Exhibit on Paul's work with Streptococci and Rheumatic Fever, Feb. 1966. l-r: Mr. Pierce, Dr. Friedman, Mr. Frank and Dr. Nellins.

Visit by Dr. Tom Ward, Feb. 1966.

Occasion of the retirement of HMC Larson, Dec. 1967.

Consultants Conference, Feb. 1967. **I-r:** Dr. Slade, Mr. Frank, Dr. Davenport. **Rear:** Dr. Jackson, Mr. Edwards, Dr. Walker and Capt. Peckinpaugh.

Mr. Frank—at the bench—'most anytime!